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HOW TO READ THE WEATHER MAP

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Awaiting Thanksgiving Day

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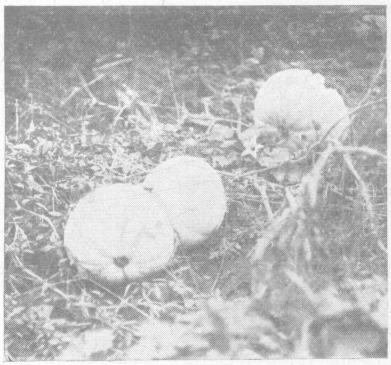
THE MAGIC VINE



A fairy seed I planted
So dry and white and old;
There sprang a vine enchanted
With magic flowers of gold.

I watched it, I tended it,
And truly, by and by
It bore a Jack o' lantern
And a great Thanksgiving pie.

—*Selected.*

NOVEMBER

Much have I spoken of the faded leaf;
  Long have I listened to the wailing wind,
And watched it ploughing through the heavy clouds;
  For Autumn charms my melancholy mind.

When Autumn comes, the poets sing a dirge:
  The year must perish; all the flowers are dead;
The sheaves are gathered; and the mottled quail
  Runs in the stubble, but the lark has fled.

Still, Autumn ushers in the Christmas cheer,
  The holly berries and the ivy tree:
They weave a chaplet for the Old Year's heir;
  These waiting mourners do not sing for me.

I find sweet peace in depths of autumn woods,
  Where grow the ragged ferns and roughened moss;
The naked, silent trees have taught me this—
  The loss of beauty is not always loss.

—*Elizabeth Stoddard.*

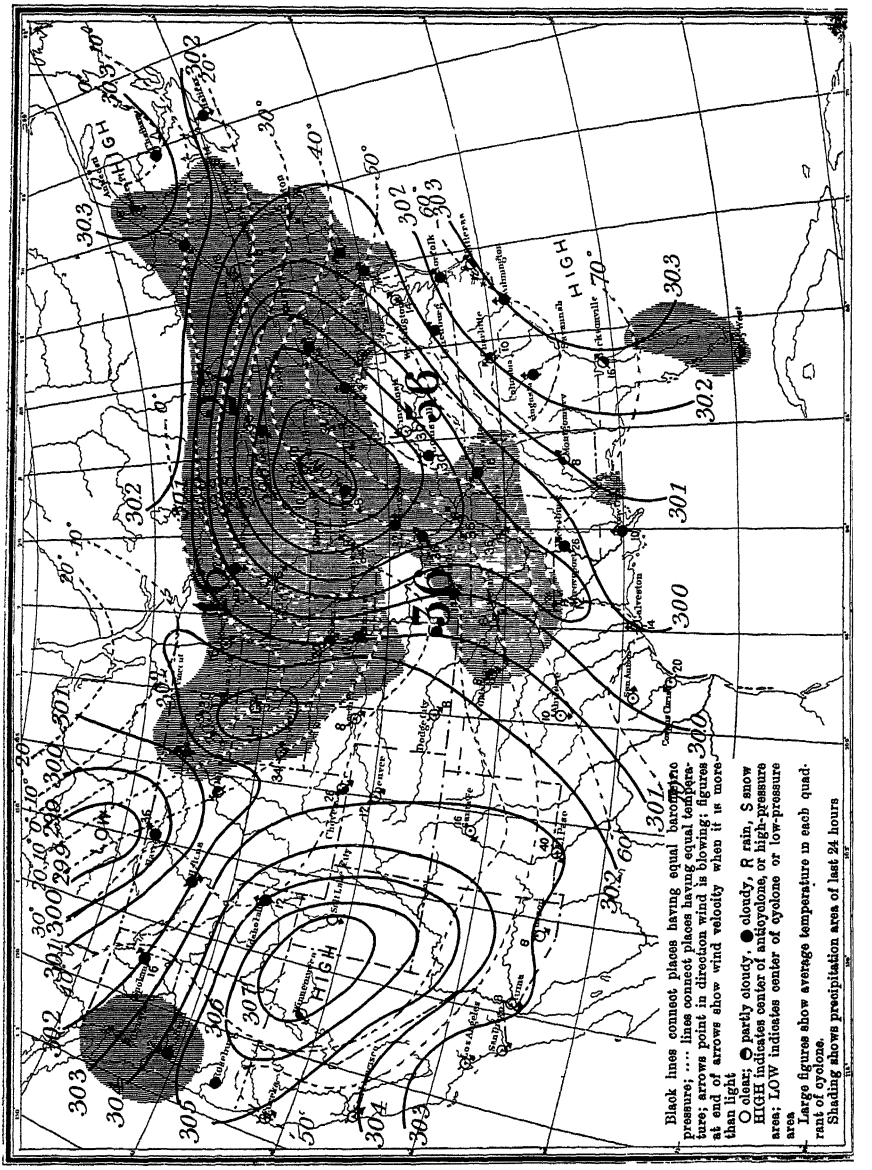


CHART No. 1. December 15, 1893 8 p m, 75th meridian time. Typical winter storm. The explanation of the different symbols and lines is given above. The large figures in each quadrant of the "Low" indicate the average temperature in that part of the storm. It is always warmest in the southeast quadrant.

HOW TO READ THE WEATHER MAPS

BY J. WARREN SMITH, SECTION DIRECTOR U. S. WEATHER BUREAU.

"I was very much interested in that lecture, but I have one criticism to make," said a former president of the Ohio State University to the writer at the close of an illustrated lecture showing weather maps, normal pressure and temperature charts, etc., "and that is that you must have some of your wife's dress patterns mixed in with those pictures."

It is true that the maps are very confusing to the casual observer and are but a tangle of lines and symbols to the new student. They are not so to the expert, however. To him they present a never ending and decidedly interesting variety of changes and conditions. The trouble necessary to master the details of the daily weather maps is far outweighed by the pleasure of being able to read them easily and to grasp the conditions presented quickly. The ability to read the maps readily is of great practical benefit also.

WHAT THE DAILY WEATHER MAPS SHOW

The maps present a picture of the weather that prevails all over the United States at 7 o'clock each morning (Central standard time). They illustrate graphically the cold waves and warm areas, the regions of stormy and fair weather, the wind direction, and the pressure of the atmosphere.

Symbols at each station show the condition of the weather and the direction of the wind, and the figures in the table that is printed in connection with the map give the temperature, velocity of the wind prevailing at the hour of observation, and the highest and lowest temperatures, and rain and snowfall since the previous map.

Think of being able to see at a glance what the weather is throughout our whole country, and up into Canada, and down into Mexico and the West Indies.

The inhabitants down along the Gulf may be sweltering in a temperature above the eighties, while up in Dakota they are hunting for fuel to keep from freezing. Or, the Atlantic coast may be in the grasp of a West Indian hurricane, while no farther west than in Ohio we may be enjoying the most beautiful weather.

HOW THE DATA ARE OBTAINED

At exactly fifteen minutes of 7, morning and night, the observers at over 200 places, pad and pencil in hand, start for the instrument shelter.

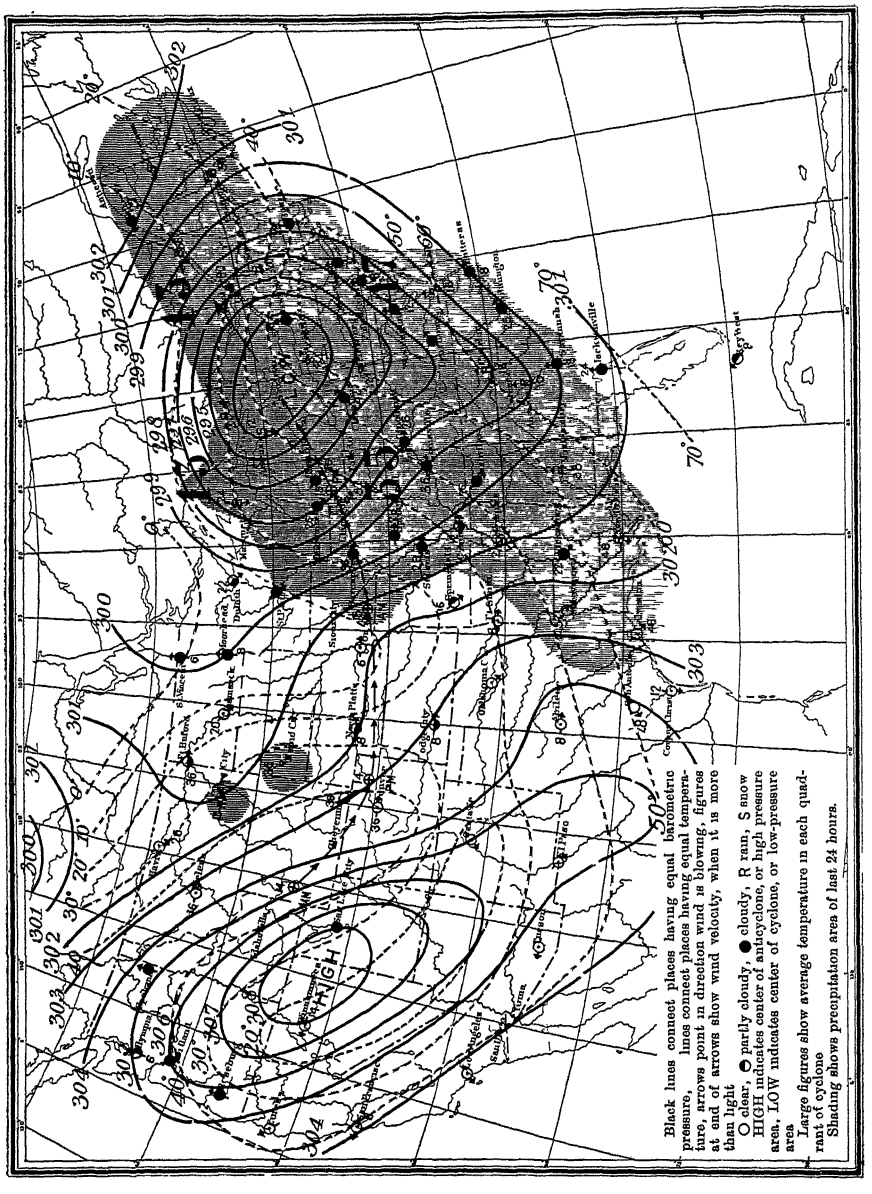


CHART No. 2. December 16, 1893, 8 a. m. This is the same storm as the preceding, but 12 hours later. The eastward movement is well shown, as well as the different weather conditions that must prevail and changes that must take place at any locality that was just to the east of the "Low" on chart 1. The long line of dark arrows indicates the path over which the center of the storm has moved since its formation over Wyoming on the morning of the 14th.

They read the instruments, record the clouds, etc., make up their telegram and file it at the telegraph office at just 7 o'clock. They must work very rapidly to do this, yet their work must be absolutely accurate. No observer is allowed to take the observations until he can do the work quickly, and then without a mistake. Errors of any kind are not tolerated for a moment in the records of the weather bureau.

When the telegrams are filed at the telegraph office, the operator must lay aside everything else, no matter how important, and send these weather telegrams without a moment's delay.

The result is that within only a few moments from the time the weather is recorded the telegrams showing the weather conditions come pouring into the Washington office, and the Columbus office, and to all the other large offices of the bureau.

TELEGRAMS IN THE FORM OF A CIPHER

The telegrams are made out in cipher; not for secrecy, but to save expense. The message sent from the Columbus office on the morning of September 30 read as follows:

"Columbus Delmar Hyatt Summon Image Diamond."

I will decipher each word: "Columbus" shows the station that the report is from.

"Delmar" means that the reading of the barometer reduced to sea level was 30.24 inches, and the temperature 52°.

"Hyatt" shows that the rainfall during the night was 0.01 inch, and during the day before a trace.

"Summon" advises us that the wind was from the northwest, the weather was clear, and that the highest temperature during the preceding twenty-four hours was 58°.

"Image" means that the wind was blowing at the rate of six miles an hour, and that the lowest temperature during the preceding twelve hours was 52°.

"Diamond" tells us that the average rainfall for the week ending that morning was 1.30 inches, and the average temperature for the week was 58°.

If there had been clouds, or if a thunderstorm or a frost had been observed, other special words would have been added.

MAKING THE MAPS

As fast as the telegrams are received the different weather conditions at all these stations are entered on outline maps of the United States, so that by 9 o'clock the weather picture is completed, and the forecasters have flashed by wire to each State the weather probabilities for the coming thirty-six or forty-eight hours

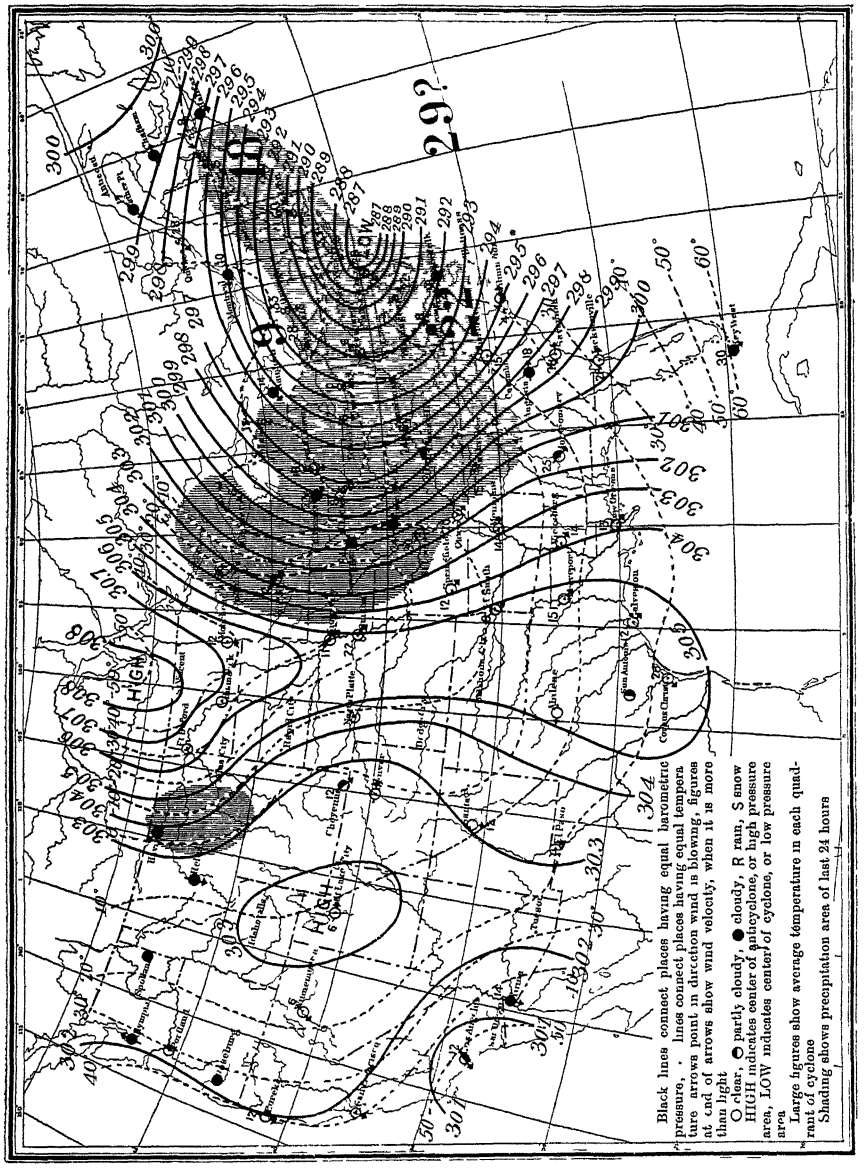


CHART No. 3. January 9, 1886, 7 a. m. A very severe winter storm on the Atlantic coast that has come from the southwest, and the whole country to the west of it in the grasp of an unusually severe cold wave; over 50° below zero in Manitoba. The pressure is very low at the center of the storm, and high gales prevail.

At the same time other men have been making the maps by the rapid stereotype process, printed them, put them in wrappers and carried them to the postoffice for mailing to teachers, business houses, and postoffices.

At the Columbus office nearly 1,000 maps are in the mail by 10:30 a. m. There is no other country on earth that can lay such a picture of the weather conditions before its official forecasters within two hours after the observations have been taken and put the completed maps in the hands of its business men in so short a time.

Our country is so large that the maps present a great panoramic view of the atmosphere over a region covering 3,000 miles from west to east and nearly as large from north to south.

DATA ON THE MAPS

The notes in connection with the maps explain the symbols, arrows, shaded areas, and the various lines.

The words "High" on these maps mean high barometer pressure, and they indicate areas where the air is piled up in heaps or waves and is therefore pressing down with greater force on the surface of the earth.

The air weighs more there than at surrounding points, and it is settling down and pushing out the air on all sides.

This can be seen by noting that the wind is blowing out from the areas of high pressure in all directions.

This air will be pushed in toward the areas where the air is light or toward the areas marked "Low," because there is a less quantity of air in that region.

So it will be noticed that the arrows around the "low" pressure areas are all pointed in toward the center. The wind does not blow straight out from the highs or straight in toward the lows, because of the rotation of the earth, but turn a little to the right.

The fact that the surface winds blow out from areas of high pressure and spirally in toward areas of low pressure furnishes one of the most important rules in weather forecasting, because if we can predict where the highs and lows will be located during the next thirty-six or forty-eight hours we can forecast the wind direction and the approximate temperature and probable weather at different points in the vicinity of these areas.

This brings us to another very important law, which is that these areas of high and low pressure, which are but waves in the atmosphere, nearly always move from the west toward the east in this latitude.

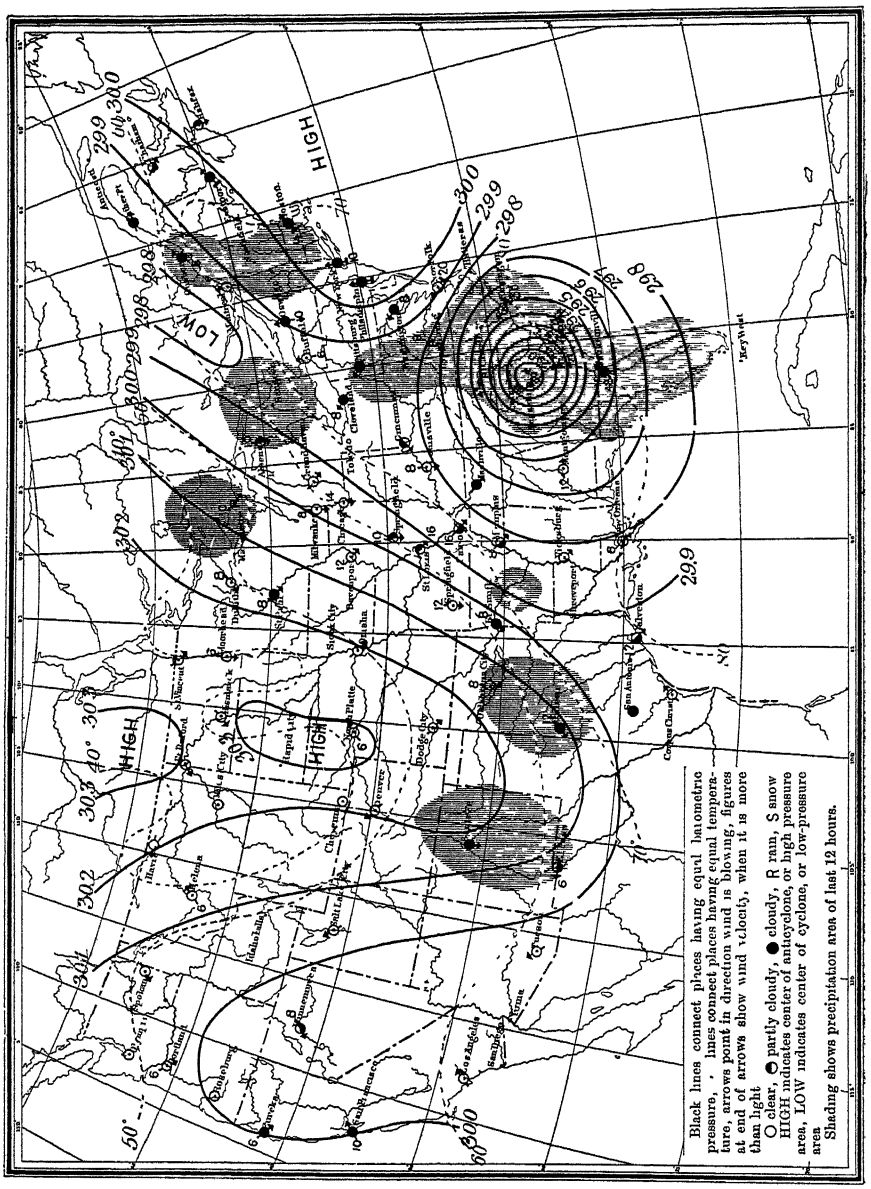


CHART No. 4. August 28, 1893, 8 a m. A well defined West Indian hurricane. The storm is very severe, with the pressure very low at the center and terrific gales prevailing about the center, but its influence does not cover a large area; this is characteristic of these tropical storms. It has been moving toward the northwest, but is just recurving toward the northeast.

Charts 1 and 2 show the eastward movement in a storm during twelve hours. Charts 4 and 5 show the movement northeastward, after the storm has recurved toward the east. The West Indian hurricanes first move toward the northwest, but recurve toward the northeast as soon as they get up into the latitude of the United States.

Chart 6 shows the average path of movement of the highs and lows that come from the west and the distance that they will move on an average each twenty-four hours. The rate of movement is never uniform, however, for the storms will sometimes move very rapidly and at other times make very little progress for several days.

With the winds blowing toward and a little to the right of the low pressure centers, it follows that as a "low" moves eastward across the country the winds must be from the southerly to the east of the center, and the temperature will be higher there because the southerly winds come from a warmer region.

To the west of the center, on the other hand, the winds will be from the northerly, and it will be colder, because the winds come from a colder region.

It follows, then, as the low pressure center approaches any place in the Ohio valley, for example from the west, it will be warmer, and then as the storm center passes by to the eastward, the winds will shift to west and northwest, and the temperature will fall. This is well shown at Cincinnati on Charts 1 and 2, and at other stations as well.

The effect of the wind direction upon the temperature of a place will be seen on these charts by noticing that wherever the winds are from the south the isotherms or dotted temperature lines are curved toward the north, and wherever they are from the north these lines are curved toward the south.

This shows very clearly the relation between the wind direction and temperature, the wind direction and pressure, and the pressure and temperature.

CLOUDY AND RAINY WEATHER ON THE MAPS

There are well defined districts on these charts where it is cloudy and stormy, and other districts where clear skies prevail. It will take but a brief inspection to show that the clear skies are within the high pressure areas, and the stormy weather in the vicinity of the lows.

The explanation is simple. The winds rise as they flow in toward the areas of low pressure, and are settling down in the areas of high pressure.

Air that is rising is expanding and cooling, because it has less work to do in holding up the air above it. Cool air cannot hold as much water in a gaseous form as warm air.

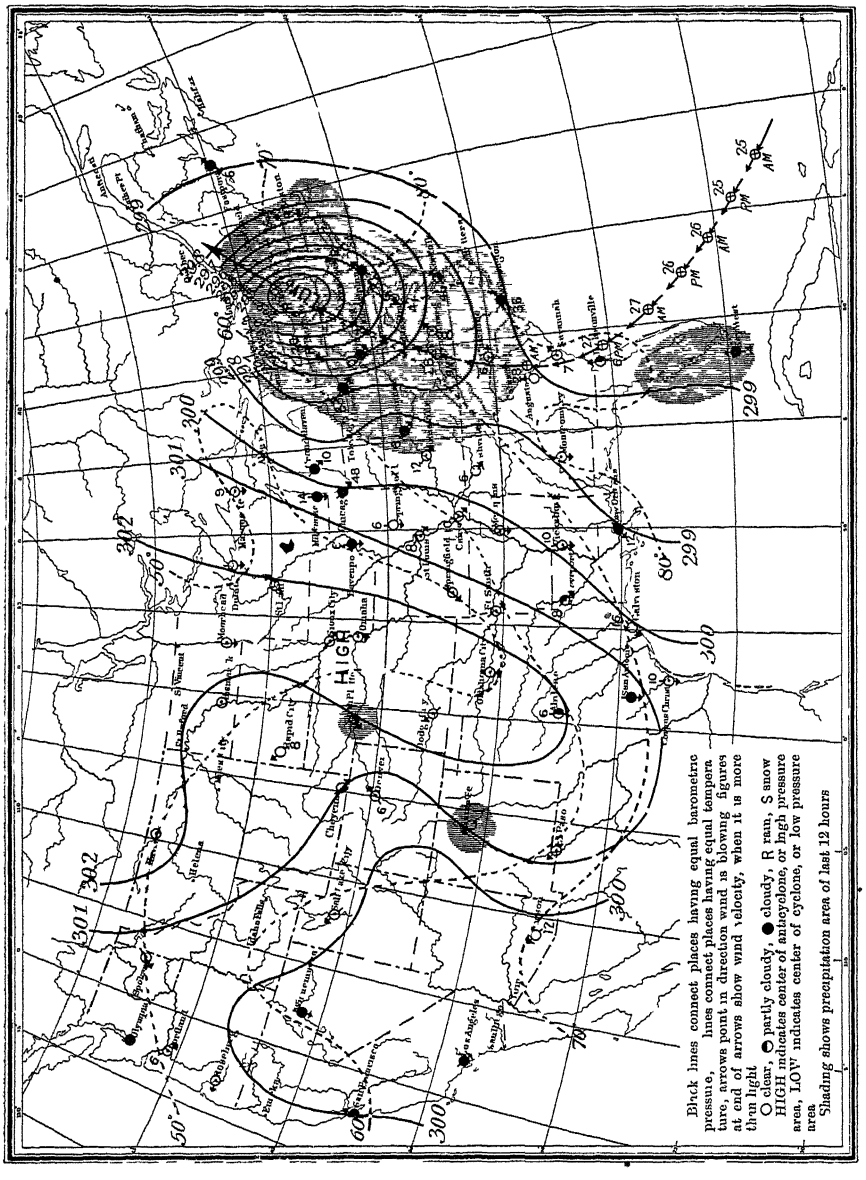


CHART No 5 August 29, 1893, 8 a m This is the same hurricane that was shown on the last chart. These usually increase in area but decrease in intensity and move more rapidly after they recurve toward the northeast. The long line of dark arrows shows the path of the center of the storm since the morning of the 25th. This storm did a great deal of damage and drowned many people on the Sea Islands off the Carolina coast It was a similar storm that devastated Galveston on September 8 1900, when 6 000 people were drowned out of a population of 30 000.

Therefore, as air rises and cools it reaches that temperature where it must give up some of its moisture, and this moisture is condensed into visible clouds and raindrops. Hence it is cloudy and stormy wherever a current of warm moist air is rising very much above its former level.

On the other hand, descending air is being compressed and warmed, and its ability to hold moisture is increasing. Hence wherever a body of air is descending the weather is most apt to be clear.

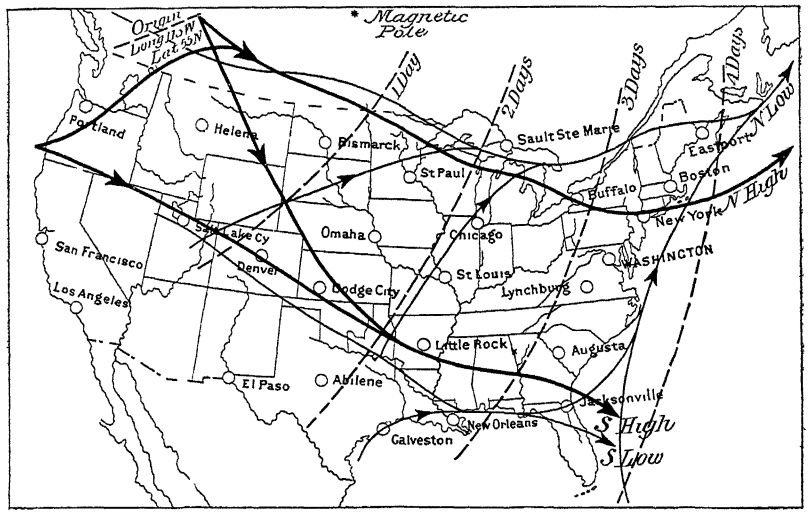


CHART No 6 Average tracks of high and low pressure areas in the United States as they move from west to east The broken lines running from northeast to southwest show the average distance travelled each 24 hours

IN CONCLUSION.

The weather map shows us, then, that atmosphere moves across the country from west to east in waves of high and low pressure

That the average rate of movement is about 600 miles a day, a little faster in winter than in summer.

That the surface winds blow spirally in and upward toward the areas of low pressure, and spirally outward and downward from the areas of high pressure.

That the low pressure areas are preceded by higher temperature and accompanied by stormy weather, and that the high pressure areas are preceded by lower temperature and accompanied by generally fair weather.

FOR THE ARITHMETIC CLASS

For practical purposes one may consider a pint of milk or water to weigh a pound. Try changing pounds to pints; not for the answer alone, but to train yourself to think of the weight or the capacity of a bucket or measure. See the measure in your mind. Draw it, if you care to do so.

A cow gives 12 pounds of milk in the evening and 10 pounds in the morning. How many gallons are given at each millking?

If the milk from one cow for one day weighs 24 pounds, how many gallons will be produced in one week at the same rate each day?

Is the quantity of milk given by the cows referred to, above or below what a good cow gives? Other points being good, what do you think these cows are worth on today's market?

A corn row is 80 rods long. Think of some distance that is a quarter of a mile long.

A few days ago the writer saw a horse that weighed about 1,500 pounds. Do you think it was a race horse or a draft horse? What is meant by draft?

A horse is 16 hands high. How many feet high is that? Where is such a measurement made?

In a space for a shock of corn, 12×12 hills, there are 420 stalks of corn. Twenty-one stalks had no corn on them—i. e., they were sterile. What per cent. of the stalks yielded corn?

If there is a loss of 10% from sterile stalks, and the yield is 63 bushels per acre, what would the yield have been had each stalk grown an ear?

Corn is worth 40 cents a bushel. What is the loss in money in the last problem?

Select ten ears of corn from the field and weigh them. Place them where mice or rats will not damage them. Some time during the first week in January weigh again. Do the same about the first of March and the first of April. Calculate the per cent. of loss at each weighing.

If corn can be marketed in the fall at 35 cents a bushel, would it pay to keep it until the first of March and sell it at 40 cents a bushel?

What per cent. will potatoes lose from digging time until the first of April? Varieties will differ.

Take ten potatoes just as they are found in the box or barrel and weigh them before and after peeling. What per cent. was removed? Answers will vary according to size of potato and according to the one who uses the knife.

How much oats is given a horse at one feed? At the present market price, what are the oats fed to a horse in November worth?

Grafting wax may be made by using one-half pound of rosin, 5 ounces of beeswax, and 3 ounces of tallow. What per cent. of the mixture is each ingredient?

How much of each would be required for 2½ pounds of wax?

A cow yields 625 pounds of milk in October. The milk tests 3.9% butter fat. How many pounds of butter fat were produced?

"EYES RIGHT" FOR NOVEMBER

In the front yard is a lilac bush that has just shed its leaves. Above the places where the leaves were fastened a large bud is now found. When will this bud develop into new leaves? Are next year's buds to be found now on the fruit and forest trees?

The willows along our road to school have something on the tips of a few of the twigs that look like gray cones. Is it a new kind of willow? Are willows cone bearing trees?

Down near the woods are some weeds whose stems have large growths or knots on them. The oak leaves have many such knots on them. What are they called? Of what use are they?

While a few rods north of some forest trees look carefully toward them. Walk to the south of them and look at the trees from that side. Do you observe any difference in the color? Why?

The leaves have served their purpose on the trees. Of what use are they on the ground? One should be able to give at least two uses.

Does the sun rise in the east and set in the west? Does it now shine any farther in at the south door or window than it did in June? Why?

Is the coat of hair on cattle and horses any different from what it was in August? Why? Does the coat of hair on the hog change with the change of season?

Where are frogs and snakes at this season?

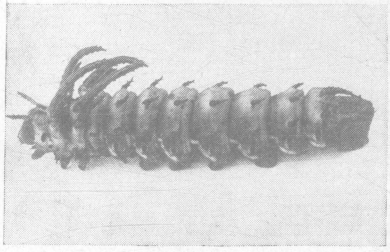
What forest tree is last to shed its leaves?

How many points has a snow crystal? Look at a snowflake, not at a picture of one.

What five birds will remain with us through the winter?

Will we have any bird visitor from the north?

WHAT IS IT?



Let us assist you in finding out the name of the plant, insect, or any other specimen you are in doubt about. Do not hesitate because what you want to ask about is common. We should become acquainted with these common things.

Children, we mean you, too.

If you will pay postage or expressage to reach us, we will return the specimen, *if desired.*

This is one of many larvæ or worms which have been sent to this department to be named. It is the Hickory Horned Devil, which turns to the Royal Moth next spring.

A. B. GRAHAM,
Superintendent Agricultural Extension.

O COME, COME AWAY.

GERMAN.